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ABSTRACT

This study examines courses in the marketing program at Northeast Wisconsin Technical College to compare the academic performance of students in traditional and learning community classroom settings. Two sections of students, a traditional 17-week course and a block scheduled 5-week course, served as the sample in the study. The block scheduling format concentrated classroom hours to four two-and-a-half-class sessions per week. This format allowed greater flexibility in planning activities that would extend beyond traditional class periods. In addition, the block scheduled course exhibited aspects of the learning community approach; it promoted coherence in the curriculum, collaborative group work among students, and a social support system between students and the faculty. The final grades of students in these two classroom settings were considered to examine academic performance. The results of the study showed that the learning community classroom produced more above-average work while the traditional classroom displayed a wider range of scores. Statistical analysis of the data concluded, however, that there was no statistically significant difference between the final grades of students from the two classroom formats. (Contains 20 references and 3 appendices.) (JCC)

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COMPARISON OF FINAL GRADES BETWEEN A TRADITIONAL CLASSROOM AND LEARNING COMMUNITY CLASSROOM AT NORTHEAST WISCONSIN TECHNICAL COLLEGE

Research Methodology

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degree of Doctor of Education

Nova Southeastern University

November, 2000

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Abstract of a practicum report presented to Nova Southeastern University in partial fulfillment of the requirements for the degree of Doctor of Education

COMPARISON OF FINAL GRADES BETWEEN A TRADITIONAL CLASSROOM AND LEARNING COMMUNITY CLASSROOM AT NORTHEAST WISCONSIN TECHNICAL COLLEGE

by

Dianne Van Beek

November, 2000

This study investigated a block scheduling pilot in the marketing program at Northeast Wisconsin Technical College. A learning community evolved from the pilot, suggesting potential differences in academic performance. The purpose of the study was to compare final grades between a learning community and traditional classroom. The research hypothesis was: Final grades achieved by Northeast Wisconsin Technical College marketing students in a learning community classroom differed from final grades achieved in a traditional classroom format.

A literature review explored similar studies, grades as measurement of academic performance, and statistics to assess the difference between means. Data was collected ex post facto from two sections of Promotion Principles. Final point scores were used to calculate a mean for each group. The null hypothesis was tested at .05 level of significance, using a two-tailed region of rejection. A t-test for independent sample means produced a calculated t value

of 0.40, compared to the critical t of 2.0395. A p level of .6902 was reported. Consequently, the null hypothesis was not rejected.

No statistically significant difference was detected between final grades in the two classroom formats. Recommendations included utilizing the study in evaluating the block pilot; undertaking further research; and providing results to students, instructors, and counselors.

TABLE OF CONTENTS

Page

LIST OF TABLES....6

Chapter

1. INTRODUCTION....7

Nature of the Problem....7

Purpose of the Study....11

Significance to the Institution....11

Relationship to Course....12

Research Questions....13

Research Hypothesis....13

Definition of Terms....13

2. REVIEW OF THE LITERATURE....15

Introduction....15

Research Studies on Learning Communities....15

Grading as a Measure of Academic Performance....18

Interpretation of Statistics to Assess the Difference Between Means....22

Conclusion....27

3. METHODOLOGY AND PROCEDURES....28

Data Collection....28

Description of Population....28

Sample....28

Instrument....29

Page

Experimental and Control Group Treatment....31
Scoring or Data Presentation....32
Data Analysis....32
Null Hypothesis....32
Alternative Hypothesis....32
Level of Significance....33
Region of Rejection....34
Statistical Test....34
Assumptions....34
Limitations....34
4. RESULTS....36
5. DISCUSSION, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS....39
Discussion....39
Conclusions....40
Implications....40
Recommendations....41
REFERENCES....43
APPENDIXES....45
A. Raw Data Comparing Final Point Scores....46
B. Histograms of Final Point Scores....47
C. t-Test Results Comparing Final Point Scores....48

LIST OF TABLES

Table Page

1. Comparison of Final Point Scores Between Learning Community and Traditional Classroom.....37

2. Comparison of t-Test Calculated Values to Reference Criteria.....38

Chapter 1

INTRODUCTION

Northeast Wisconsin Technical College (NWTC) is located in Green Bay, Wisconsin, with satellite campuses in Marinette and Sturgeon Bay, Wisconsin. Serving Northeast Wisconsin since 1913, NWTC is one of 16 institutions in the Wisconsin Technical College System offering a two-year associate degree. According to the 1999-2000 College Catalog, the student population at NWTC is over 40,000 people annually, with about 13,000 taking courses leading to a degree. The marketing program is one of 65 programs offered (pp. 2-4). Annual enrollment in the marketing program is over 100 students.

Nature of the Problem

During the spring semester of 1999, the Marketing Department of Northeast Wisconsin Technical College seriously considered the addition of an alternative class scheduling system to the traditional schedule of three one-hour sessions per week. The new design that was considered was a block system, which featured a course structure of four 2-1/2-hour class sessions per week, allowing completion of the course within five weeks.

A good deal of enthusiasm was expressed among the faculty to experiment with this new design. There was much speculation about the possible benefits of block scheduling. Expected benefits included a more accessible entrance and exit from five-week courses and a tighter schedule that would allow one class-free day. In addition, the block design would allow clearer focus for students who concentrated on just two courses at a time, one in the morning and one in the afternoon.

After a preliminary study of existing block programs, the marketing program at NWTC offered the block alternative to marketing students during the 1999-2000 academic year.

Courses from the first year of the two-year curriculum were offered in a block format as well as in the traditional format. The block format allowed completion of two courses within five weeks, but it maintained an equivalent number of hours of classroom activity to traditional courses.

As the block program progressed through the academic year, an unanticipated result occurred with its participants. The intense concentration of time in the classroom led to the natural formation of a learning community. In the learning community, students tended to develop close relationships both inside and outside of the classroom. The bonding was encouraged by their common desire to succeed in the course, leading to a high level of collaboration among students. The relationships tended to strengthen as the students evolved together through a sequence of courses. The learning community offered a social support system that was different from the traditional classroom.

Subsequent investigation of the literature revealed that the block schedule is a hybrid between two more commonly employed learning community models. These two models, linked courses and coordinated studies, are described by Gabelnick, MacGregor, Matthews, and Smith (1990b, pp. 20-37). The linked courses model is the simplest learning community form in terms of curricular strategy; the coordinated studies model, on the other hand, requires a more drastic reorganization of course offerings than other learning community models.

The linked courses structure involves teaming two courses that have a relationship that can benefit students. These two courses could be related to a similar topic, or they could exhibit a more symbiotic relationship, e.g. a written composition course linked with a sociology course. Linked courses create a learning community by pairing two courses in the class schedule so that a cohort of students registers for both classes. Faculty members who are assigned to the linked

courses teach individually; however, they coordinate their syllabi and/or assignments to some degree. There is considerable latitude in the degree to which coordination occurs between the linked courses. Regardless of the level of coordination in content, learners have the benefit of a familiar group of classmates in both courses, thus building a sense of security and cooperation (Gabelnick et al., 1990b, p. 20).

Coordinated studies, on the other hand, engage both faculty and students in a fulltime interdisciplinary learning community. Three to five faculty members are exclusively assigned to teach in an intensive block mode that is focused on a central theme. Students enroll for the entire program, rather than selecting course-by-course offerings; however, they are generally awarded credit for the individual courses. Schedule flexibility is a major benefit of a coordinated studies learning community. With coordination by the assigned faculty members, the schedule allows time for options like extended discussions, lab sessions, field trips, or films. This model presents many creative opportunities for learning based on a common goal for learners and faculty. The integrated relationships among learners, faculty, and subject matter provide a rich environment for student-centered learning (Gabelnick et al., 1990b, pp. 28-31).

There is generally a ratio of one faculty member to 20 students in the coordinated studies model (Gabelnick et al., 1990b, pp. 28-29). The ratio of faculty to students is a consideration listed by the Study Group on the Conditions of Excellence in American Higher Education in their 1984 report to the Secretary of Education and the Director of the National Institute of Education (p. 33). The report specifies that a distinctive feature of effective learning communities is that they generally are smaller than most other classes on campus.

According to Gabelnick et al. (1990a, pp. 80-81), faculty and students report that coherence is one of the benefits of the learning community structure. A traditional curriculum

and schedule often suffers from incoherence in regard to time and relationships. In contrast, the learning community offers the coherence of a familiar group of learners pursuing a focused program of study for an extended time period. Faculty members are keenly aware of the coherence created when they work together to coordinate offerings and cooperate in course delivery.

The NWTC block structure resembled the linked courses model in that there was a lack of coordination between various faculty members who were assigned to concurrent course offerings during each five-week period. However, the program was designed to enroll a group of students through a sequence of paired courses. Though each block course was individually open to any student through the college timetable of courses, most enrollees engaged in the entire model of six courses over three five-week blocks in a semester. As described by the coordinated studies model, class size tended to be small, with only one of the six block classes exceeding an enrollment of 20 students. The 2-1/2 hour class sessions provided flexibility in planning extended activities beyond traditional classroom constraints, which is characteristic of the coordinated studies model. Shapiro and Levine refer to individually taught courses linked through cohort enrollment in a block schedule as a "paired-course learning community" (1999, p. 23).

The block scheduling format had been run as a pilot program, requiring subsequent evaluation to determine the viability of its continuation. Numerous measures were made to assess the success level of the program. These measures included (a) course enrollment, (b) student retention, (c) student attendance, (d) student perception of achievement of course competencies, (e) student perception of achievement of core abilities, and (f) instructor satisfaction with the program. The problem was that it was unknown whether the learning

community atmosphere resulted in a difference in final grades over the traditional class format among marketing program students at Northeast Wisconsin Technical College.

Purpose of the Study

The purpose of the study was to investigate the impact of the learning community on course grades. The study compared the final grades between a block format course and traditional course at Northeast Wisconsin Technical College. By comparing final grades between marketing students in a learning community classroom to marketing students taking the same course in a traditional classroom format, it was possible to statistically prove whether the learning community model had an impact on academic performance.

Significance to the Institution

The flexibility of the block scheduling alternative aligned with the following Vision Statement that was announced in the 1997-1998 Annual Report of Northeast Wisconsin Technical College:

> Provide all learners with the highest quality, life-long learning opportunities that are what they want, when they want, where they want, and how they want them so that they may continue their learning and successfully engage in a career that enhances their quality of life in a global community. (p. 1)

The block scheduling pilot also offered an opportunity for the marketing program to respond to three critical success factors that had been identified by Northeast Wisconsin Technical College. These factors called for measurements of success in the following areas: (a) product delivery, (b) product sales, and (c) product effectiveness. The College had established a key performance indicator (KPI) to measure each critical success factor.

According to the April 26, 1999, draft of "Next Steps: On the Road to Our Vision," the key performance indicator for product delivery was the challenge to "Expand variety of delivery methods of services & learning opportunities over time, place & method to customers"

(Northeast Wisconsin Technical College, 1999, p. 5). The KPI for product sales was the challenge to "Increase # of customers provided learning opportunities and the intensity of their learning" (p. 5). The KPI for product effectiveness was the challenge to "Increase customer satisfaction with services and learning, cost effectively" (p. 5). Each departmental team in the College was expected to establish goals and action steps to help achieve the critical success factors.

The block scheduling pilot promised to address these three success factors. First, the unique delivery format of block scheduling responded to the key performance indicator of expanding methods of product delivery. Second, the potential to increase enrollment in the marketing program, through built-in entrance points every five weeks, dealt with the KPI of increasing product sales. Third, the potential for improved retention rates in the five-week block courses, as a measurement of customer satisfaction, addressed the KPI of product effectiveness.

However, the decision to offer block scheduling required significant adjustments in scheduling rooms and instructors. In some cases it led to offering an additional section to provide both the block and traditional formats. Thus, continued offering of this program would continue to impact the institution administratively and financially. Such commitments in resources suggested a need to document the effectiveness of the new program.

Relationship to Course

This study was directly related to the Research Methodology course. The study required a research design including the hypothesis, data collection procedures, and sampling design. The study used inferential statistics to compare the mean point total of marketing students completing Promotion Principles under the block format versus students completing Promotion Principles

under the traditional format. Results of the study suggested whether possible cause-and effect relationships existed between academic performance and course delivery format.

Research Questions

This study focused on one major research question. The research question was: Is there a difference between final grades achieved by marketing students who are in a learning community classroom format versus final grades achieved by marketing students in a traditional classroom format?

Research Hypothesis

The research hypothesis for this study predicted an answer to the research question. The research hypothesis was: Final grades achieved by Northeast Wisconsin Technical College marketing students in a learning community classroom differ from final grades achieved in a traditional classroom format.

Definition of Terms

For the purposes of this practicum the following terms needed clarification:

Block scheduling pilot. The course format of the block scheduling pilot offered classes in 2-1/2-hour sessions. Classes were held four days per week, leading to a three-credit course completion in five weeks. Students enrolled in two courses per five-week block, which allowed them to complete six courses within a semester.

Classroom format. Classroom format functioned as the independent variable in this study. The learning community classroom format in the block scheduling pilot was compared to the traditional classroom format.

Collaborative learning. Collaborative learning involves students in discussion and activities with each other. Students are encouraged to cooperate, rather than compete, as they engage in learning.

Final grades. Final grades functioned as the dependent variable in this study. Final grades were based on accumulated points. Students were awarded a maximum of 600 points reflecting their academic performance on exams, quizzes, and a project. Final point totals were used to compare mean grade averages between marketing students in the block format versus the traditional format. Final point scores may be converted to letter grades using the following scale: 540-600 points = A; 480-539 points = B; 420-479 points = C; 360- 419 points = D; Below 360 points = F.

Learning community classroom format. "'Learning communities,' a specific term that is a curricular intervention to enhance collaboration and expand learning...are also referred to as learning clusters, triads, federated learning communities, coordinated studies, and integrated studies; but 'learning communities' has emerged as the favorite descriptor" (O'Bannion, 1997, p 18). Under this structure, a group of students enrolls in a sequence of concentrated classes, thus fostering collaborative learning.

Traditional classroom format. The traditional classroom format at Northeast Wisconsin Technical College enrolls students in a variety of courses during the semester without regard to developing a common cohort of students from course to course. Classes are scheduled over the span of 17 weeks, with three 50-minute class periods per week.

Chapter 2

REVIEW OF THE LITERATURE

Introduction

The literature review focused on three areas. The three topics were as follows: (a) results of research studies on the relationship of learning communities to academic performance, (b) the use of grading as a measure of academic performance, and (c) the interpretation of statistics to assess the difference between the means of two groups.

Research Studies on Learning Communities

The learning community, which consists of a cohort of students who bond together through a series of classes, is gaining popularity at both universities and community colleges. The following three reasons have been postulated for this upsurge: (a) more coherence to the curriculum, (b) decreased ill feeling about impersonal institutions, and (c) increased interaction among students. Large scale quantitative studies have consistently shown that students in learning communities are more satisfied with their classes, perceive themselves as having learned more, and are less likely to drop out than traditional students (Cross, 1999, p. 18).

One large scale quantitative study was conducted on the Coordinated Studies Program (CSP) at Seattle Central Community College. A comparison was made between 121 students in the CSP program and 166 students in the traditional program. Retention of students into the following quarters was higher for the CSP group. In addition, the learning community student group reported higher involvement in outside activities with other students, more positive views of the institution, higher levels of perceived learning, higher levels of enjoyment, and increased time devoted to study (Cross, 1998, pp 9-10).

Other studies that support the academic achievement of students in a learning community are presented by Eastern Washington University, LaGuardia Community College, and SUNY at Stony Brook (Gabelnick, MacGregor, Matthews, & Smith, 1990, pp. 64-65). At Eastern Washington University, Freshman Interest Group cluster students had slightly lower GPA's than control groups at college entrance. By the end of the fall term, and again at the end of the freshman year, the learning community mean grade point surpassed that of the control groups.

At LaGuardia Community College, several studies have been done to compare student achievement in Learning Clusters studying composition versus the general student population. Learning Cluster students showed a 12 to 14 percentage point higher pass rate than noncluster students. After data over several years were collected, it was shown that 60 percent of the Learning Cluster students were achieving A or B performance versus 42 percent for noncluster students who entered with similar backgrounds and skills.

At SUNY at Stony Brook, a follow-up study was conducted on Federated Learning Community alumni. The study revealed that students' grades rose by the end of a one-year learning community. Furthermore, these students' grades continued to rise after the experience.

Shapiro and Levine (1999, pp. 171-172) report studies at University of Missouri-Columbia and University of Maryland that show increased academic achievement in learning communities. At University of Missouri-Columbia the 1995 Freshman Interest Group learning community achieved a mean GPA of 2.89 versus a mean of 2.66 for other students. This difference was even higher when comparing students of equal ability upon college entrance. At the University of Maryland, the College Park Scholars Science, Technology, and Society and Life Sciences learning communities were initially outperformed by matched control groups after

one semester of participation. However, after the third and fourth semesters of participation, the learning communities achieved higher grades in science and math.

O'Banion (1997, p. 200) notes the success of learning communities in Palomar College's Extended Opportunity Programs and Services (EOPS). For three years, the college has allowed 25 students per semester to enter Starting Blocks learning communities. Composed of linked courses in English, mathematics, reading, and college success skills, the program produced students with slightly higher grade point averages than other EOPS students

The increased academic achievement that is apparent in learning communities can be explained in terms of the different type of experience that this classroom offers. "When we enter a community, our probability of success often increases because of the extended intelligence we now share within the group and the fact that our shared participation actually constitutes a way of exercising intelligence" (Wildman, 2000, p. 7).

O'Banion designates collaborative learning as one of the Six Key Principles of the Learning College. In his work with the League for Innovation in the Community College, O' Banion reiterates the importance of establishing cohorts of students who engage in supporting each other in the learning process. He cites learning communities as the most common utilization of collaborative learning in community colleges. (1997, pp. 15-19).

Though a limited number of extended comparative studies of student achievement have been undertaken, there is general agreement among faculty in learning communities regarding the high level of student achievement. The range of success in a traditional classroom is typically more widespread than in the learning community, which produces more above-average work. Faculty also remark that learning community projects often demand more work from students and thus produce higher quality results (Gabelnick et al., 1990c, p. 64).

Advocates of learning communities have strong feelings about the value of the programs in relation to their effort and costs.

> Implementing and sustaining learning communities is not an easy thing to do. Doing so reflects a big change in our traditional way of doing things in the academy. However, all that we know and continue to find out about how people learn best indicates these communities are an effective structure to promote good learning. (Wildman, 2000, p. 7)

Continued research on the effects of learning communities on academic achievement are necessary to document this new trend.

Grading as a Measure of Academic Performance

Isaac and Michael (1997, p. 156) list grade point averages as a typical example of a nonstandardized measure of student achievement. However, recently there has been much controversy over the adequacy of course grades to assess student learning. Kohn, one of the most vocal critics, has received nationwide attention, arguing that "the categories are too rigid, the criteria too subjective, the tests on which grades are based too superficial" (1993, p. 201).

Other leading forces in the criticism of current assessment processes have been regional accrediting agencies such as the North Central Association and the Mid-Atlantic Association. Requirements for accreditation now include the following components: (a) assessment of student learning both directly through vehicles like tests and projects, and indirectly through vehicles like opinion surveys and job placement, (b) a relationship between assessment and the mission, goals and objectives of the college or department, (c) attention to validity and reliability, (d) widespread faculty involvement, (e) the use of assessment information for improvement, and (f) the integration of assessment with planning and budgeting (Walvoord & Johnson Anderson, 1998, pp. 3-4).

Walvoord and Johnson Anderson (1998, pp. 4-6) contend that the direct assessment of student learning through vehicles such as tests and projects should not be denigrated, as has been

the recent trend, but should be integrated into a total meaningful system of evaluation. Grades are necessary to provide feedback to students on their progress, as well as to serve as quantifiable indicators for the success of a program.

Three grading models for calculating course grades are proposed by Walvoord and Johnson Anderson. The three models are (a) weighted letter grades, (b) accumulated points, and (c) definitional system (1998, pp. 93-98). The systems vary in their ability to accommodate student development after a slow beginning, and in their capacity to compensate poor performance in one area through high performance in another area.

The weighted letter grades model assigns a percentage of the course grade to performance on separate categories, e.g. tests, projects, and class participation. The weighting of each category is dependent upon the value that an instructor places on that category. Regardless of whether a student achieves a high or low letter grade in a category, there is no cumulative effect to compensate another category, i.e., each category stands as a separate grading component. Unless specifically built into individual systems, there is no standard provision for weighting a developmental progression of grades over the duration of the course.

The accumulated points system assigns points for tests, projects, and other components. These points are accumulated in a pool, thus allowing a student with low performance in one area to compensate through high performance in another activity. Another advantage to the student is the possibility of overcoming poor performance at the beginning of the course through increasingly higher performance as the course progresses. Extra credit points are also easily applied to this system, allowing students to potentially achieve points beyond the pre-established point total for the course. The extra-credit opportunity is another device to offset poor performance in one area.

The definitional system defines two or more components of the course in terms of the minimum standard allowable for a letter grade. In this system, the minimum standard must be met for each component to qualify for the letter grade. For example, if one component qualifies for an A, but the other component qualifies for a B, the student will receive the B grade. Instructors may set whatever percentage or minimum standard that they feel appropriate to achieve the final letter grade. In this system there is no compensation for weak areas below the standard that is set by the instructor. It is very important to explain this system carefully to the students, so that they understand that the various components are not being averaged. Students have a tendency to see the definitional system as awarding grades based on their lowest level of performance.

Another common practice, grading on a curve, holds several disadvantages. Grading on a curve assumes that each class is a sample population, and that only a certain percentage of students should receive each letter grade, based on a standard statistical distribution. Some students will engage in cutthroat competition to achieve the limited number of high grades available. Other students will give up hope of achieving a high grade, feeling that others in the class have a higher likelihood of attaining the limited number of available high grades. On the other hand, if all students score poorly, there is a perception that standards will be lowered to allow a limited number to achieve a high grade. Under this system, the role of the instructor is regarded as doling out grades according to a formula, rather than helping all students to achieve the highest grade possible (Walvoort & Johnson Anderson, 1998, pp. 100-101).

Walvoort and Johnson Anderson point out that despite efforts to achieve objective grading standards, one must "recognize that there is no such thing as an absolutely objective evaluation based on an immutable standard" (1998, p. 11). The perplexity over grading

standards is heightened by changes in social meaning over grades. Past practices of grading on a curve established an average grade as C; however, "the 'average' grade in the United States today is in the B range" (p. 12). As instructors struggle with grading as an assessment tool, they are influenced by this unofficial norm.

Isaac and Michael (1997, pp. 158-161) provide a long list of multiple criterion measures for evaluation of school programs. Some of their criteria relate to the evaluation instruments of learning in a course. These criteria include "teacher-made achievement tests (objective and essay), the scores on which allow inferences regarding the extent to which specific instructional objectives have been attained (p. 158). The authors also include "demonstration of new or increased competencies such as those found in physical education, crafts, homemaking, and the arts that are not measured in a highly valid fashion by available tests and scales" (p. 160).

A key to establishing validity of measurement of student learning is the relationship of the measurement instrument to student-performance objectives. This premise is a time-honored principle among vocational educators. "Objectives should serve as the basis for all evaluation in occupational programs or the achievement of the individual student learners enrolled in the programs" (Erickson & Wentling, 1979, p. 68).

If properly related to performance objectives, both objective tests and projects can be accurate indicators of student learning. There are advantages and disadvantages to each of these assessment instruments. The most popular form for tests is multiple-choice items. Multiple choice items can be used to assess many different achievement levels within the cognitive domain. Multiple-choice exams are also easier to interpret than open-ended questions. One major disadvantage of a multiple-choice test is that it does not require the student to organize and present learned material and ideas (Erickson & Wentling, 1979, pp. 87-93).

Matching-item tests are a variation of multiple-choice tests. The main advantage of matching-item tests is their efficiency to sample a large amount of material in a short period. The most often cited disadvantage is difficulty in using these tests to assess any behavior beyond factual information, such as the memorization of relationships (Erickson & Wentling, 1979, p. 111).

Conversely, the ablility to assess numerous behaviors, including complex activities in a realistic setting is the strongest advantage of a performance test, such as that experienced in project work. "This type of assessment has impressive face validity and credibility in occupational programs because it generally relates very closely to a job situation" (Erickson & Wentling, 1979, p. 130) However, a disadvantage of performance evaluation is subjectivity by the rater. The relationship of the project to course objectives is critical in assigning grades.

Interpretation of Statistics to Assess the Difference Between Means

Educators should be familiar with statistics not only to improve evaluation of student learning, but also to conduct research studies. An understanding of how to analyze the results of a research study is a necessary skill. "Quantitative research relies heavily on numbers in reporting results, sampling, and providing estimates of instrument reliability and validity. Statistics are methods of organizing and analyzing quantitative data" (McMillan & Schumacher, 1997, pp. 202-203.

Statistical techniques are divided into two broad categories: descriptive statistics and inferential statistics (McMillan & Schumacher, 1997, p. 203). Descriptive statistics describe basic characteristics of data in a study. They summarize and organize the data. "Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data" (Trochim, 1999, p 263). Inferential statistics depend on descriptive statistics. After

summarizing the data with descriptive statistics, the researcher can proceed to use inferential statistics.

> Inferential statistics...are used to make inferences or predictions about the similarity of a sample to the population from which the sample is drawn. Since many research questions require the estimation of population characteristics from an available sample of subjects or behavior, inferential statistics are commonly used in reporting results. (McMillan & Schumacher, 1997, p. 204)

Descriptive statistics use three central measures of central tendency: the mean, median, and mode. The mean is used most frequently to describe the average because every score is used in its computation. However, extremely high or low scores tend to distort the impression of the average score. The median can be used to describe data having extreme scores. The median is the middle score in a set of data, and thus it is not affected by a few unusually high or low scores. Finally, the mode represents the score that appears most frequently in a set of data. This measure of central tendency is unsophisticated and is rarely used in educational research (McMillan & Schumacher, 1997, pp. 210-213).

In a perfect distribution of scores, the mean, median, and mode will coincide. The normal bell-shaped distribution curve is used to calculate many statistics. Though large numbers of data from a population will display a normal distribution, smaller samples may be positively skewed or negatively skewed. If the mean is higher than the median, a positive skew will result. If the mean is lower than the median, a negative skew will result (McMillan & Schumacher, 1997, pp. 213-216)

A graphic representation of the distribution of scores assists in organizing the data and interpreting the results. The histogram is commonly used to display frequency of scores. In a histogram, the horizontal axis rank-orders the scores from lowest to highest. The vertical axis indicates the level of frequency for each score. A bar graph is used to portray the data. Skewed

data is more clearly visualized through the use of a histogram (McMillan & Schumacher, 1997, pp. 207-210).

Descriptive statistics also include measures of variability. The range and standard deviation are used to describe how the data are dispersed. The range simply measures the difference between the lowest score and the highest score. It is an unsophisticated measure of dispersion that can be misinterpreted if there is an unusually high or low score.

Standard deviation is a more useful measure because it indicates the average variability of scores from the mean. Standard deviation is the square root of the variance (McMillan & Schumacher, 1998, pp. 216-220). "Computationally, the variance is the sum of the squared deviation scores about the mean divided by the total number of scores" (p. 623). Because the variance is reported as the square of raw scores, standard deviation is calculated to keep results consistent with raw data.

Inferential statistics can be employed with descriptive statistics to determine the probability of the sample yielding the same results that the entire population would be likely to produce. Numerous tests can be applied to the data to check this probability. Researchers interested in comparing the means of two groups generally use either a Z-test or a t-test. A Z-test is used when the sample is over 30 scores. The t-test is used when the sample is under 30 scores (Nova Southeastern University, 2000, p. 10). Isaac and Michael (1997, p.181) concur that a sample size of 30 is a standard guideline for deciding between a Z-test and a t-test. However, they point out that there is no definite rule on this dividing line. Hoffman, Hoffman, and Hoffman (1993-1999) cite 35 as the dividing point between the Z-test (which used to be called the large sample method) and the t-test (which used to be called the small sample method). Isaac

and Michael further label the t-test as "satisfactory for large samples; particularly appropriate for small samples" (p 183).

Of further consequence in using a t-test is the size of the experimental group in comparison to the control group. A t-test on the difference between the means of two groups is most sensitive if the samples are of exactly equal size (Hoffman et al., 1993-1999).

In a t-test, if the critical t is less than the calculated t, it signifies that the difference in means appears to be greater than the null hypothesis specifies. Therefore, the null hypothesis can be rejected. The level of significance is determined when constructing the null hypothesis. It is commonly set at .05 in social research (Trochim, 1999, p. 278). This probability level, or p value, indicates the acceptable level of chance for error in concluding that the sample is representative of an entire population.

The decision to set the level of significance higher or lower than .05 is determined by the importance of avoiding either Type I errors or Type II errors. If the level of significance is lowered to .01, for example, there will be less likelihood of rejecting the null hypothesis when it is in fact true, a Type I error. On the other hand, raising the level of significance to .10, for example, will increase the likelihood of Type I errors, but indirectly limit the occurrence of Type II errors. Type II errors occur when a null hypothesis is not rejected when it is in fact false (McMillian & Schumacher, 1997, pp. 360-362).

The researcher must also determine if a one-tailed or two-tailed test is appropriate. The one-tailed test allows the entire p value of to be at either end of the distribution, while the two-tailed test divides the p value in half, e.g,. a probability level of .05 is split into .025 at each end of the distribution. Significance tests are considered to be two-tailed unless otherwise specified.

Researchers should use the more liberal one-tailed test only if they are very confident that their research hypothesis will be accepted (McMillan & Schumacher, 1997, pp. 360-365).

Rejecting the null hypothesis establishes the probability that the research hypothesis is believable. However, failure to reject a null hypothesis does not necessarily indicate that the null hypothesis reflects reality. "Especially in cases with a small sample size (which makes it more difficult to find a significant difference) a nonsignificant finding should be interpreted to mean that further research is necessary, not that there is no relationship" (McMillan & Schumacher, 1997, p. 362).

Ex post facto research presents special challenges because a number of rival hypotheses might explain differences in non-manipulated groups. Careful planning of the study can limit these hypotheses to an observed difference on a dependent variable. Four steps are employed to achieve maximum control in these causal-comparative designs. First, a research problem should be formulated that suggests a possible cause of the dependent variable. Second, plausible rival hypotheses that might explain the relationship should be considered. Third, the groups to be compared should be selected. These groups should be as homogeneous as possible with respect to plausible rival hypotheses, but heterogeneous with respect to the independent variable. Fourth, data on the subjects should be collected and analyzed. Data on factors that might constitute rival hypotheses should be included in this process, as well as data on the dependent variable (McMillan & Schumacher, 1997, pp. 303-305).

Results of ex post facto studies can lead to only cautious cause-and-effect statements. Causal relationships are reliant upon the use of comparison groups that are homogeneous on all important variables except the independent variable, thus ruling out other potential rival hypotheses.

Conclusion

The literature review revealed numerous findings to assist in shaping this research study. First, reports on previously conducted studies showed consistently superior academic performance by learning communities. Second, an accumulated points system for grading, if carefully based on course objectives, holds many advantages to accurately assessing student learning. Third, inferential statistics can be used to test for a statistically significant difference between two groups on a dependent variable. However, in an ex post facto study, the ability to establish causal relationships is limited by the extent to which plausible rival hypotheses are discredited.

Chapter 3

METHODOLOGY AND PROCEDURES

This study used the research methodology. The research methodology was appropriate for this problem because a possible cause-effect relationship could be examined between mean final point scores achieved by students in two different classroom formats. The probability of a potential cause-effect relationship could be objectively tested through inferential statistics.

Data Collection

Data collection took place ex post facto. In the Spring 2000 semester, the principal investigator was involved in teaching Promotion Principles in both the block format and the traditional format. Final points achieved by marketing students in each of the two classes were obtained from the instructor class record book. In addition, birth dates to calculate student age were obtained from the NWTC AS-400 Student Profile Menu.

Description of Population

The population for this study was marketing program students at Northeast Wisconsin Technical College. It included all daytime students enrolled in the program as of the Spring 2000 semester, regardless of the number of courses completed. The population also included all future marketing program students.

Sample

The convenience sample for this study consisted of all marketing students in two sections of Promotion Principles taught by the principal investigator in the Spring 2000 semester. Promotion Principles is a required core course that is taken in the second semester of the marketing program. Both sections comprising the sample were taught in the daytime. The experimental group was in a course section made up of solely marketing program students in a

learning community classroom. The control group was made up of marketing program students who were taking a traditional format class. Thus, the control group students intermingled with students from various other programs in their course section.

Marketing students were given the opportunity to choose either the block classroom format or the traditional classroom format when they registered for classes in the 1999-2000 academic year. Both schedules were presented to students during new student orientation, and students selected whichever format they preferred.

Potential differences between the experimental group and control group that could confound the study were investigated. Similarities that were found between the two groups included (a) same instructor, (b) same course with same textbook and same grading structure, (c) students in same semester of same program, and (d) same daytime population. In addition it was determined that both groups were comprised of slightly more females (54% females in the experimental group and 60% females in the control group). Both groups were also similar in age (average age of 20.2 for the experimental group and 20.6 for the control group). Thus the marketing students in each section were drawn from the same population and were assumed to be equivalent groups.

Instrument

The primary goal for students in the Promotion Principles course was to design a promotion plan for a local business. Other less directly measurable goals for student achievement included the following five core abilities: (a) communicate effectively, (b) work cooperatively, (c) set and achieve goals, (d) think critically and creatively, and (e) access and use appropriate information resources (Van Beek, 1995, p. 1).

All tests, quizzes, and projects were designed to support these goals and measure achievement of the student performance objectives for 104-126 Promotion Principles. The nine competencies for the course were as follows: (a) Relate the promotional elements to the marketing mix. (b) Create an overall sales promotion plan for a specific business or product. (c) Develop an overall advertising plan to communicate a sales promotion activity. (d) Plan a special event for a business, detailing the execution and proposing a calendar for implementation. (e) Compile a realistic budget for a short-term sales promotion/advertising activity. (f) Design appealing advertising messages.
(g) Prescribe effective measurement tools to judge the success of a sales promotion. (h) Integrate long-term image building into promotional strategies. (i) Describe the expanding role of international advertising and promotion in today's economy (Van Beek, 1995, p. 1).

Students in both groups were given identical opportunities to achieve course points. Both sections were given four identical multiple-choice take-home exams (400 total points) and five identical in-class matching-item quizzes (100 total points). Both sections were assigned the same course project (100 points). All students were also given the opportunity for 30 extra-credit points through small projects.

All tests and projects were evaluated by the instructor. The multiple-choice objective tests were judged to be reliable based on repeated use with minor revisions over five years. Projects were subjectively evaluated based on fulfillment of course competencies. In-class matching quizzes were scored in class by peers, based on answers provided by the instructor. All tests, projects, and quizzes were scored with the number of points achieved; scores were then entered into the instructor class record book by the instructor.

Points were accumulated over the duration of the course. Final point scores were translated into course grades based on the following scale: A = 540-600 points; B = 480-539 points; C = 420-479 points; D = 360-419 points; F = Below 360 points.

Experimental and Control Group Treatment

The experimental group belonged to a block scheduling pilot program. This group of marketing program students had built a close relationship over a sequence of courses. Promotion Principles was preceded by 10 other courses in the block format during the 1999-2000 academic year. Because the students spent up to five hours together in the classroom for four days per week, they had developed personal bonds characteristic of a learning community. Collaborative learning was consistently employed in the experimental group. Students in the block section chose to work as one large team to complete their term project. The team approach to the project in the block section complemented the learning community environment, and was facilitated by the small class size of 13 students. Take-home tests were often openly discussed by peers in the classroom as they debated their responses. Extra-credit opportunities were also team-oriented. The only grading component in the course that was not community-oriented was the in-class quiz. These quizzes were completed independently by all students.

The control group consisted of 20 marketing program students who had chosen traditional 17-week classes, each class with its own unique mix of students. These classes were comprised of students from a variety of programs, resulting in less homogeneity in the group. Each class in a traditional student's schedule was made up of a different group of people.

In the Promotion Principles course, students in the traditional section were instructed to work with a partner from the class to complete their project. The diverse make-up of the class, as well as the class size of 30 students, dictated the partnered approach to projects, as opposed to

one large team. Extra-credit opportunities were also partner-oriented. Take-home tests were completed outside of the classroom, with no opportunity for the instructor to observe any level of collaboration. In-class quizzes were completed independently by all students.

Scoring or Data Presentation

Final point scores achieved by marketing program students in both sections of Promotion Principles in the Spring 2000 semester were entered on an Excel spreadsheet. All marketing students in these sections who completed the course, regardless of whether they passed or failed, were included in the tabulation. The mean of the learning community students' final point scores were compared to the mean of the traditional format marketing students' final point scores.

Data Analysis

The data was analyzed to determine whether a null hypothesis would be rejected. After determining the nature of the study (difference between), the level of measurement (nominal and interval), and a level of significance to define a testable hypothesis (.05), an appropriate statistical test was applied to the data.

Null Hypothesis

The null hypotheses (HO) was: There is no statistically significant difference between final grades achieved by Northeast Wisconsin Technical College marketing students in a learning community classroom versus final grades achieved in a traditional classroom format.

Alternative Hypothesis

The alternative hypothesis (HA) was: There is a statistically significant difference between final grades achieved by Northeast Wisconsin Technical College marketing students in a learning community classroom versus final grades achieved in a traditional classroom format.

Level of Significance

The level of significance for this test was $p = .05$. The null hypothesis would be rejected if there were less than a five percent probability that the observed difference between final grades could be based on chance. The alpha level of .05 is commonly used in social research (Trochim, 1999, p. 278). Although a lower level of significance, such as .01, could further limit the likelihood of Type I errors, an indirect result would be the increased likeliness of Type II errors. Because the avoidance of a Type II error in this study was determined to be more important than the avoidance of a Type I error, the .05 level of significance was more appropriate than .01. It was decided not to raise the level of significance even higher to .10 because it was desirable to have more than a 90% confidence level that the null hypothesis would not be rejected if it was true (McMillan & Schumacher, 1997, pp. 360-362).

Region of Rejection

The region of rejection for this test was two-tailed. The hypothesis predicted that a difference would occur between the grades of block format students and the grades of traditional format students. Because the hypothesis did not predict which of the two scores would be higher, the two-tailed region of rejection was appropriate. The one-tailed test is more liberal and is recommended for use only when there is strong likelihood that a null hypothesis will be rejected (McMillan & Schumacher, 1997, p, 365).

The critical t value at the .05 level of significance for a two-tailed test with 31 degrees of freedom is 2.0395. A calculated t value greater than the critical value will result in rejection of the null hypothesis (Trochim, 1999, p. 278).

Statistical Test

The statistical test that was selected for this study was the t-test for independent sample means. This test is the most commonly used procedure to determine the level of significance between the different means of two groups that have no relationship to each other. Based on the similar population from which the groups were drawn, the two-sample t-test assuming equal variances was used. The small size of the groups, 13 in the experimental group and 20 in the control group, resulted in degrees of freedom of 31. As indicated by Isaac and Michael (1997, pp. 181 & 183) and Hoffman et al. (1993-1999), the use of a t-test is appropriate with this sample size.

Assumptions

It was assumed that all grades upon which this study was based were an accurate reflection of academic performance. Another assumption was that the two groups in this study differed only on the characteristic of whether or not they represented a learning community. All other characteristics of the sample groups were equivalent in nature. Use of the t-test relied on two basic assumptions for independent sample means: (a) it was assumed that both groups had a normal distribution, and (b) it was also assumed that the variances of error scores were homogeneous between groups.

Limitations

Several threats to internal validity were present in this study. The small size of the sample groups was considered a limitation. Another potential limitation of the study was the difference between the two sample groups on the length of the course. Although both groups completed 51 classroom hours, the control group completed the course in 17 weeks while the experimental group completed the course in five weeks. A further possible limitation of the

study was experimenter bias due to the fact that the principal investigator taught both sections and was instrumental in originating the block learning community model at the College.

Limitations to external validity also existed. The results of this study were limited to the marketing program at Northeast Wisconsin Technical College. Students in the two sample groups taking this required core course were representative of marketing program students at this institution only.

Chapter 4

RESULTS

The collection of data for this ex post facto study involved defining the population, selecting a sample that was characteristic of the population, and describing the instrument that resulted in the dependent variable. The experimental and control group treatment was also examined to detect any possible extraneous variables that might suggest a rival hypothesis. After minimizing threats to the validity of the study, the data was presented on an Excel spreadsheet.

The data was analyzed in relation to a null hypothesis and an alternative hypothesis. A level of significance of .05 was determined with a two-tailed region of rejection. The t-test for independent sample means was chosen to test the null hypothesis. The two sample t-test assuming equal variance was performed with the Excel software program. Assumptions and limitations of the study were outlined as a final step in the procedures.

As seen by the raw data in Appendix A, final point scores in the learning community ranged from 416 points to 607 points, resulting in a range of 191 points. The 607 point score, which reflects extra credit, is the only measurement from both groups that exceeds 600 points. Scores in the traditional classroom ranged from 360 to 572, resulting in a range of 212 points.

Other descriptive statistics for the experimental group and control group are shown in Table 1. This table indicates the mean point score of each group, as well as the standard deviation. As can be seen by Table 1, the experimental group consisted of 13 subjects, while the control group consisted of 20 students. The mean for the experimental group was calculated at 532.4615. The mean for the control group was 524.60. The variance for the experimental group was 3586.769, yielding a standard deviation of 59.88964. The variance for the control group was 2641.621, yielding a standard deviation of 51.396702.

Table 1

Comparison of Final Point Scores Between Learning Community and Traditional Classroom

	Measures of Central Tendency and Variability		
Classroom	n	M	S
Learning Community	13	532.4615	59.889640
Traditional	20	524.6000	51.396702

Histograms displaying the final point scores for both the learning community classroom and the traditional classroom can be seen in Appendix B. Both histograms displayed a negative skew. The learning community classroom had a median score of 547, as opposed to the mean of 532.4615. The traditional classroom had a median score of 537.5, as opposed to the mean of 524.6.

A t-test was performed to investigate the presence of a significant difference between the learning community classroom mean and the traditional classroom mean. A printout of the Excel worksheet used to conduct the t-test is displayed in Appendix C. No significant difference was found between the two means, $t(31) = 0.40$, $p < .05$. The calculated t was less than the critical value of 2.0395 for the .05 level of significance for a two-tailed test. The p value was 0.6902. A summary of the t-test results is shown in Table 2.

Table 2

Comparison of t-Test Calculated Values to Reference Criteria

	Measures of Significant Difference	
Inferential Statistics	t	p
Calculated Values	0.40	0.6902
Reference Criteria	2.0395	.05

The t-test results indicated that the dependent variable failed to represent adequate evidence to reject the null hypothesis. Thus, the outcomes of data collection and data analysis proposed a conclusion to the original research question: Is there a difference between final grades achieved by marketing students who are in a learning community classroom format versus final grades achieved by marketing students in a traditional classroom format?

Chapter 5

DISCUSSION, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Discussion

The failure to reject the null hypothesis in this ex post facto study is contrary to results of other studies reported in the literature. Learning community classrooms produce strong evidence of improved academic behavior at the college level. Numerous studies were cited in the literature review indicating that learning community classrooms foster higher academic performance.

One study done at the University of Maryland, however, did show a delayed reaction to the learning community environment. At this university, the College Park Scholars Science, Technology, and Society and Life Sciences learning communities were initially outperformed by matched control groups after one semester of participation. However, after the third and fourth semesters of participation, the learning communities achieved higher grades in science and math (Shapiro and Levine, 1999, p. 172).

Descriptive statistics in the study tended to coincide with findings in the literature. Gablenick et al. (1990c, p. 64) observed that traditional classrooms tend to display a wider range of academic performance, with learning communities producing more above-average work. In this study, the traditional classroom scores had a range of 212 points as compared to a range of 191 points for the learning community. Sixty-two percent of the scores in the learning community were above 540 points (designated as an A), compared to 45 percent of the traditional classroom scores above 540 points.

The assumption in this study that grades were an accurate reflection of student performance was given support by several sources. Walvoord and Johnson Anderson (1998,

pp. 100-101) outlined the accumulated points system as having some definite advantages over other grading systems. The use of tests and projects to evaluate academic performance is supported by Isaac and Michael (1997, pp. 158-161), provided that all measurements are related to course competencies (Erickson & Wentling, 1979, p. 68).

Conclusions

Based on the t-test, the null hypothesis was not rejected. It was concluded that no statistically significant difference could be proved between final grades achieved by Northeast Wisconsin Technical College marketing students in a learning community classroom versus final grades achieved in a traditional classroom format. The failure to reject the null hypothesis, however, does not necessarily prove that, in reality, there is no difference between final grades. It simply denies conclusive evidence that a difference exists.

Implications

Several reasons present themselves as possible explanations for the finding in this study, which is contrary to findings reported throughout the literature on the positive effect of learning communities on academic performance. One possibility is that the learning community may produce more dramatic academic achievement over time. As in the case of the University of Maryland with their College Park Scholars Science, Technology, and Society and Life Sciences learning communities, more conclusive evidence of improved academic achievement may surface in the third and fourth semesters, as compared to a second-semester study.

Another possible explanation for the result lies in the small sample size, which was listed as a threat to internal validity. A small sample size presents more difficulty in finding a significant difference. Thus, though the null hypothesis was not rejected in this study, the

findings do not necessarily prove that there is no difference between final point scores in learning communities and traditional classrooms.

The failure to reject the null hypothesis does provide important implications to skeptics of the block scheduling concept. Because of the concentrated timeframe of courses, reducing them from 17 weeks to five weeks, there has been some doubt expressed as to students' capability to achieve at academic levels as high as when in a traditional classroom. The descriptive statistical results of this study show a higher mean average for block-format learning communities than for traditional classrooms. Inferentially, a significant difference between mean final point scores was not proven, however. The failure to find a significant difference implies to skeptics that the two classroom formats provide equal opportunities for academic achievement.

The issue of the 17- week course versus the five-week course was recognized as a potential threat to internal validity. It is possible that the duration of a course could be a contributing factor to the final grades for students in the course. Thus the learning community atmosphere may not be the only determinant of differences in grades from traditional classrooms.

Concern over external validity of this study prevents generalizing to a population beyond the marketing program at NWTC. However, the results of the study can contribute to the literature on learning communities. Evaluation of this evolving trend in adult education requires a growing collection of documented formal studies.

Recommendations

It is recommended that results of the study be added to the bank of information that has been collected to track the success of the block scheduling pilot in the NWTC marketing program. The failure to reject the null hypothesis does not provide evidence of differences

between academic achievement of students in the block-format learning communities versus traditional classroom settings. Neither does failure to reject the null hypothesis prove that differences do not exist. Thus, this study alone does not provide conclusive evidence on the success of the block scheduling pilot.

Therefore, it is also recommended that further research be conducted as a means to achieving more conclusive evidence. Evaluating final grades of third and fourth semester students may provide more insights. In addition, increasing the sample size could assist in defining significant differences.

It is recommended that results of the study be disseminated among three groups of stakeholders. Students and instructors can use the study results to assist them in their decision as to whether to participate in the block program. Counselors should also be made aware of the results of the study, so that they can provide students with an accurate comparison on academic achievement results. It is important for these three stakeholders to be aware that the block program has undergone evaluation of academic achievement. Documented studies of this nature convey the concern of the College to provide high quality education as dictated in the NWTC Vision Statement:

> Provide all learners with the highest quality, life-long learning opportunities that are what they want, when they want, where they want, and how they want them, so that they may continue their learning and successfully engage in a career that enhances their quality of life in a global community. (Northeast Wisconsin Technical College, 1998, p. 1)

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APPENDIXES

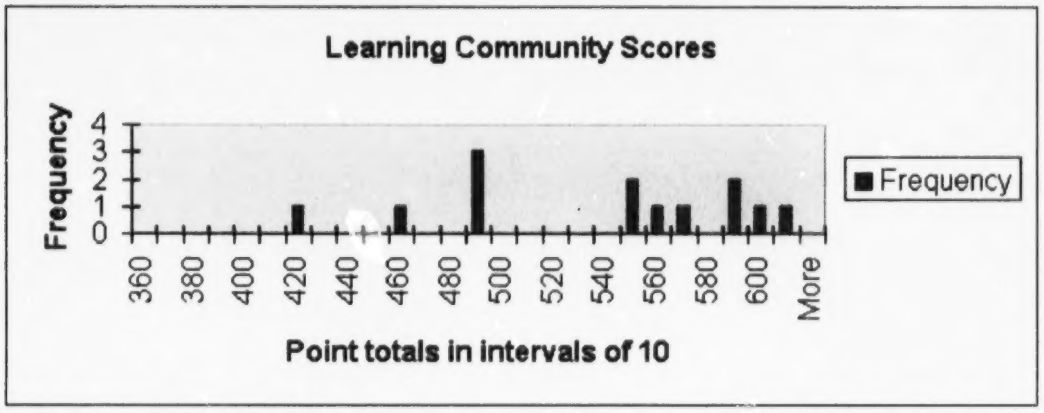
Appendix A

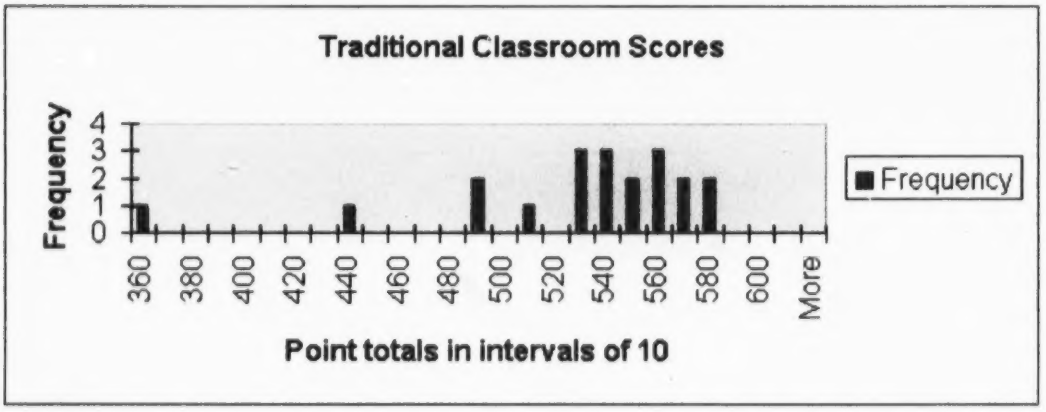
Raw Data Comparing Final Point Scores

Learning Community	Traditional
416	360
459	437
485	484
485	488
488	504
541	525
547	527
556	529
570	531
584	536
587	539
597	544
607	546
	553
	555
	559
	562
	570
	571
	572

Appendix B

Histograms of Final Point Scores





Appendix C

t-Test Results Comparing Final Point Scores

Learning Community	Traditional
416	360
459	437
485	484
485	488
488	504
541	525
547	527
556	529
570	531
584	536
587	539
597	544
607	546
	553
	555
	559
	562
	570
	571
	572

t-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	532.4615385	524.6
Variance	3586.769231	2641.621053
Observations	13	20
Pooled Variance	3007.484864	
Hypothesized Mean Difference	0	
df	31	
t Stat	0.4023792	
P(T<=t) one-tail	0.345083101	
t Critical one-tail	1.695518677	
P(T<=t) two-tail	0.690166203	
t Critical two-tail	2.039514584	

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